Introduction

Grafting and cuttings are two promising vegetative propagation techniques for shea domestication. The survival rates of grafted plants (86.67%) are higher than those obtained by cuttings (26.9%). The rooting substrate has a significant influence on the rooting rate. Rice bran was found to be the best substrate compared to coconut fiber and sand. The survival rate of the cuttings also depends on the hormone used and the nature of the cutting used. Vegetative propagation could be the favorable option for shea propagation, as the seeds (nuts) are in competition between consumption and propagation.

Shea (Vitellaria paradoxa C. F. Gaertn) is a woody species of the Guinean and Sudanese savannah zone. The range of the shea tree extends over nearly 1 million km² in 21 Sub-Saharan countries with multiple uses (Naughton et al. 2015). However, the main product of this tree remains its oil, derived from its kernels, which is highly prized for medical, cosmetic, and food uses (Both 2015). The demand for shea nuts is constantly increasing and future forecasts show the same trend (Fastaat, 2018). However, this situation is accompanied inversely with productivity and this due to the long regeneration time, the long period set to fruit and the aging of existing stands. This has necessitated research on various propagation techniques such as grafting, cuttings and stratification (Okao et al. 2016) to increase tree productivity. To address these constraints, vegetative propagation is necessary.

The present study was initiated and aims to investigate propagation by cuttings and grafting of shea tree, in order to promote its domestication in the near future.

Methods

Study environment

The cutting and grafting trials carried out within the framework of the present study were conducted in two communities (Poukou and Fali) of the central Benin cotton zone of 10,800 km² with a Sudano-Guinean type of climate with a sub-tropical national and the Sudano-Sahelian type.

There are also loamy soils with varying degrees of concretion, sandy soils, sandy-clay soils and black and hydromorphic soils in the valleys. Rainfall varies from 360 to 468 mm spread over 80 to 110 days. Costs and logistics are totally calibrated. Shea stands are also found in this area.

Conduct of Cutting Trials

Cutting trials were conducted at the Agricultural Research Center (CRA-Centres) in Savé (Benin). The propagation device used to conduct the trial measured 2 m in 1 m in 0.8 m and was subdivided into 3 compartments. A wooden box was supplied with a transparent polyethylene film of 3 mm thickness to maintain a moderate temperature, humidity and light intensity favoring the propagation. The box was filled with peat and soil with a ratio of 3:1 and watered three times a week, the watering was done according to the level of productivity, health status and also the availability of rains of the year during the implementation of trials (Aliou et al. 2017).

The growth hormone used was: Indole Butyric Acid (IBA) at a concentration of 1000 ppm was used to accelerate the growth of cuttings and apple vera gel. The cuttings were dipped in the hormone at 1 cm from the base for five seconds before being placed in the polyethylene propagator containing the rooting substrate. These substrates were carbonized rice bran, coconut fiber and cardboard (soil from the trial site). After planting, the cuttings were rinsed as explained. The trial lasted 120 days. In the experimental design used were 3-block split-plot where substrates are assigned to large plots and hormones to small plots. The total number of cuttings in the trial was 580 (1 substrates*3 hormones*22 plants*10 replications). Observations were made on the rooting period and the recovery rate of the cuttings.

Results and discussion

Cutting trials were carried out from 360 cuttings previously immersed in Indole Butyric Acid (IBA) or apple vera on 3 different substrates (peat and mixed coconut fiber, carbonized rice bran and sand) under a split plot frame. Main Results: The vegetative propagation technique by shea cuttings is promising for shea domestication. The survival rate of cuttings is 27%. The type of substrate has a significant influence on the rooting rate. Rice bran was the best compared to coconut fiber and soil at the experiment site. Carbonized rice bran highly favored (p<0.01) the rooting of shea cuttings compared to other substrates. AIB was better than Aloe Vera. The survival rate of the cuttings is also a function of the hormone used and the nature of the cutting used. Future research could be oriented towards the in situ monitoring of Vitellaria paradoxa cuttings as a function of time.

Conclusion

Grafting and cuttings are two promising vegetative propagation techniques for shea domestication. The survival rate of grafted plants (86.67%) are higher than those obtained by cuttings (26.9%). The rooting substrate has a significant influence on the rooting rate. Rice bran was found to be the best substrate compared to coconut fiber and sand. The survival rate of the cuttings also depends on the hormone used and the nature of the cutting used. Vegetative propagation could be the favorable option for shea propagation, as the seeds (nuts) are in competition between consumption and propagation.

Key References


Figure 1: Evolution of the budding of Vitellaria paradoxa cuttings as a function of time

Legend. RiceAIBVeg : Stem cutting with rice substrat and AIB hormone ; RiceAIBFlor : Floriferous cutting installed on carbonized rice bran with AIB hormone; RiceAloeV : Vegetative cutting installed on carbonized rice bran with Aloe vera hormone; RiceAloeFlor : Floriferous cutting installed on carbonized rice bran with Aloe vera hormone; CocoaAIBVeg : Vegatative cutting installed on coconut husk with AIB hormone; CocoaAibFlor : Floriferous cutting installed on coca rock with AIB hormone; CocoaAloeVeg : Vegetative cutting installed on coca rock with Aloe vera hormone; CocoaAloeFlor : Floriferous cutting installed on coca rock with Aloe vera hormone; SandAibVeg : Vegetative cutting installed on sand with AIB hormone; SandAloeFlor : Floriferous cuttings installed on sand with AIB hormone